

Griffy Lake Nature Preserve Vegetation Monitoring Update

Summer 2017



History of Deer Population in Indiana

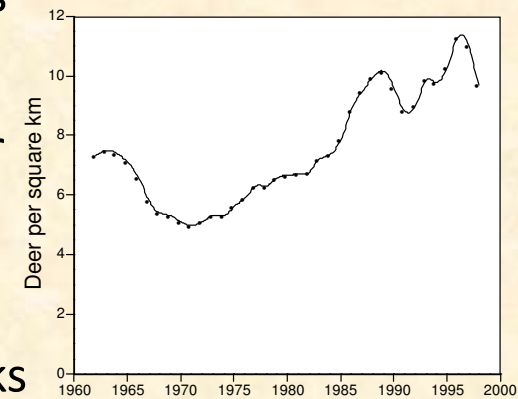
- early 1900s: Essentially all deer in Indiana killed by hunting and habitat destruction
- 1930s: Deer reintroduced to state
- 1950s: Populations re-established and modern hunting programs begun
- 1990s - present: Historic high deer populations
- Forest vegetation in Bloomington area affected by deer than other areas



Causes of High Deer Populations

Primary causes of deer increase

- improved forage from agriculture & towns
- elimination of natural predators
- increase in edge habitat preferred by deer
- supplemental feeding
- warmer winters
- hunters (and regulations) often favor bucks
- Reduction in number of hunters



Deer populations in Wisconsin from 1960 to 2000



Images from Fairfield County, Conn. Deer Management Alliance. www.deeralliance.com

Effects of Deer on Ecological Communities

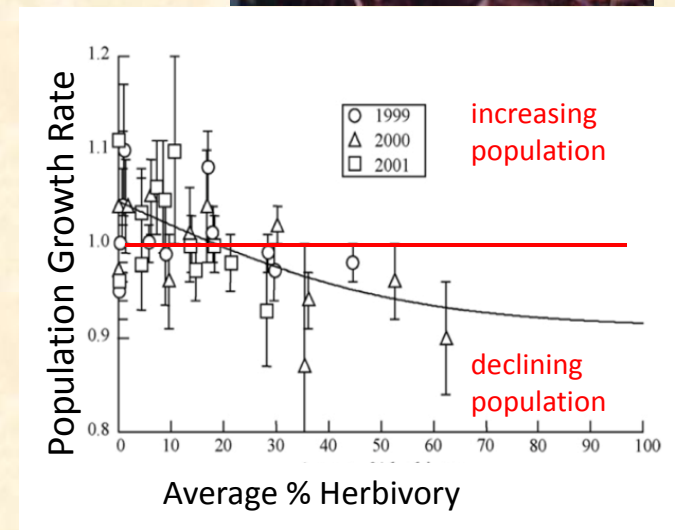
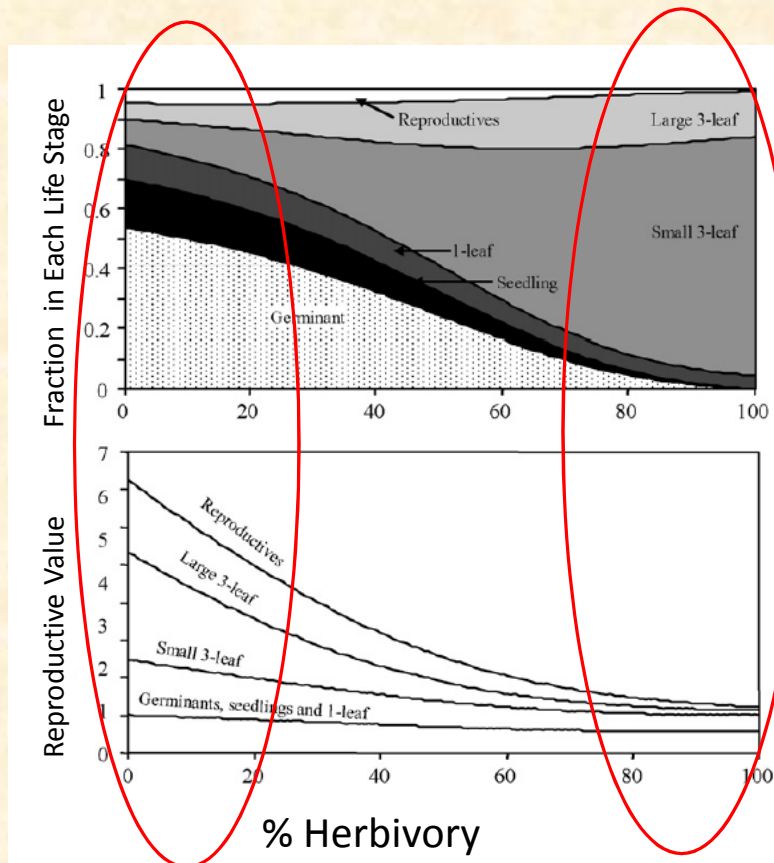
Study of Effects of Deer on Indiana State Parks by George Parker and Chris Webster in 1996

- Unhunted state parks had
 - fewer tree seedlings and shrubs
 - lower % cover of herbaceous species
 - higher cover of unpalatable species
- Since state park hunts began, there has been a dramatic increase in understory forest diversity and plant coverage
- In Wisconsin, several state parks without hunting lost over 50% of plant species



Effects of Deer Browsing on a Forest Herb

Large-flowered Trillium, *Trillium grandiflorum*



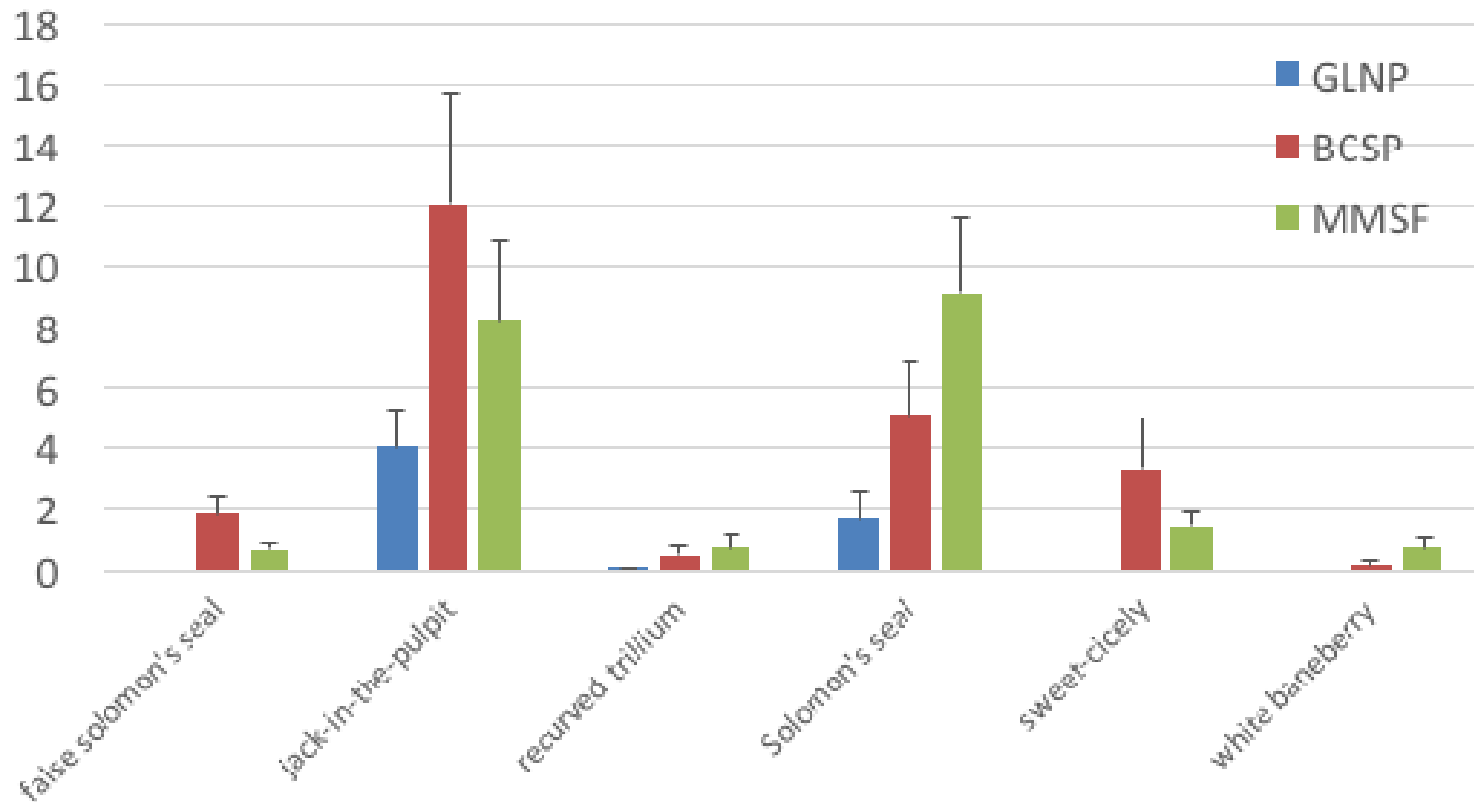
Knight, Caswell, and Kalisz. 2009. Forest Ecology and Management 257: 1095.

Griffy Lake Nature Preserve Comparative Vegetation Data 2017

Data collected by Peter Slothower 28 April – 12 May 2017

Data summarized by Angie Shelton, 18 May 2017

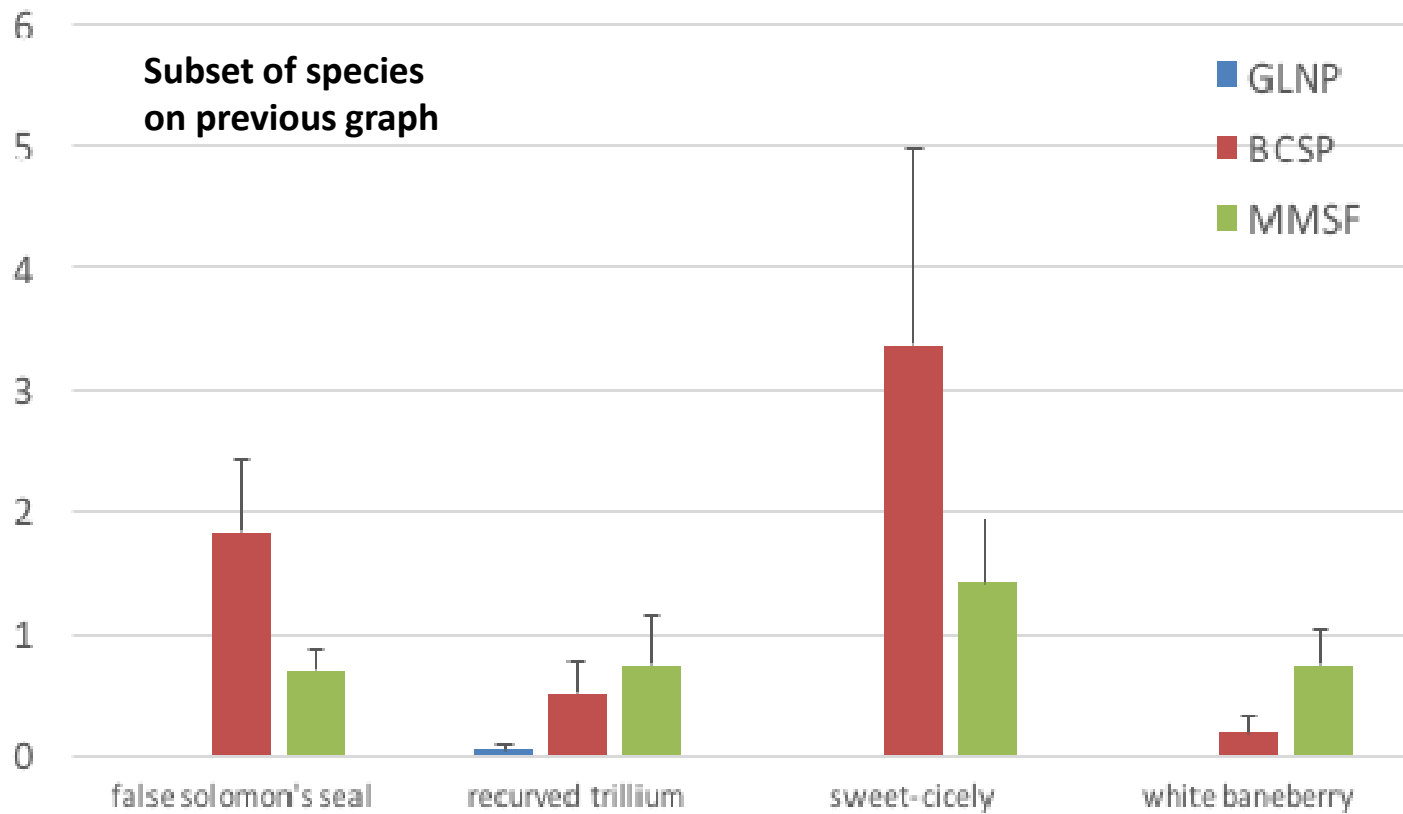
Average # Flowering Plants Per Transect



All six species have fewer flowering plants at GLNP.

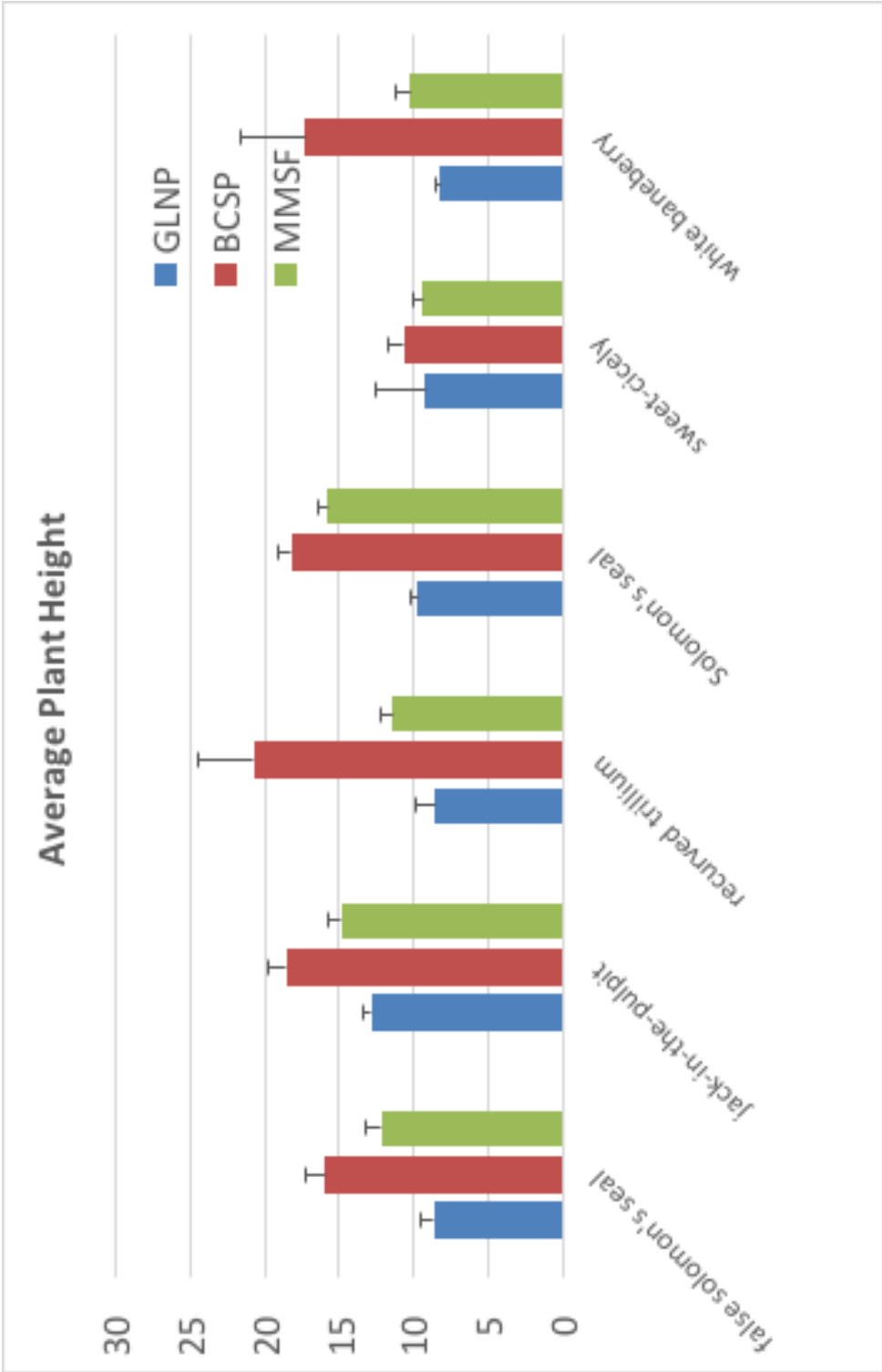
See detailed view of less common species on next slide.

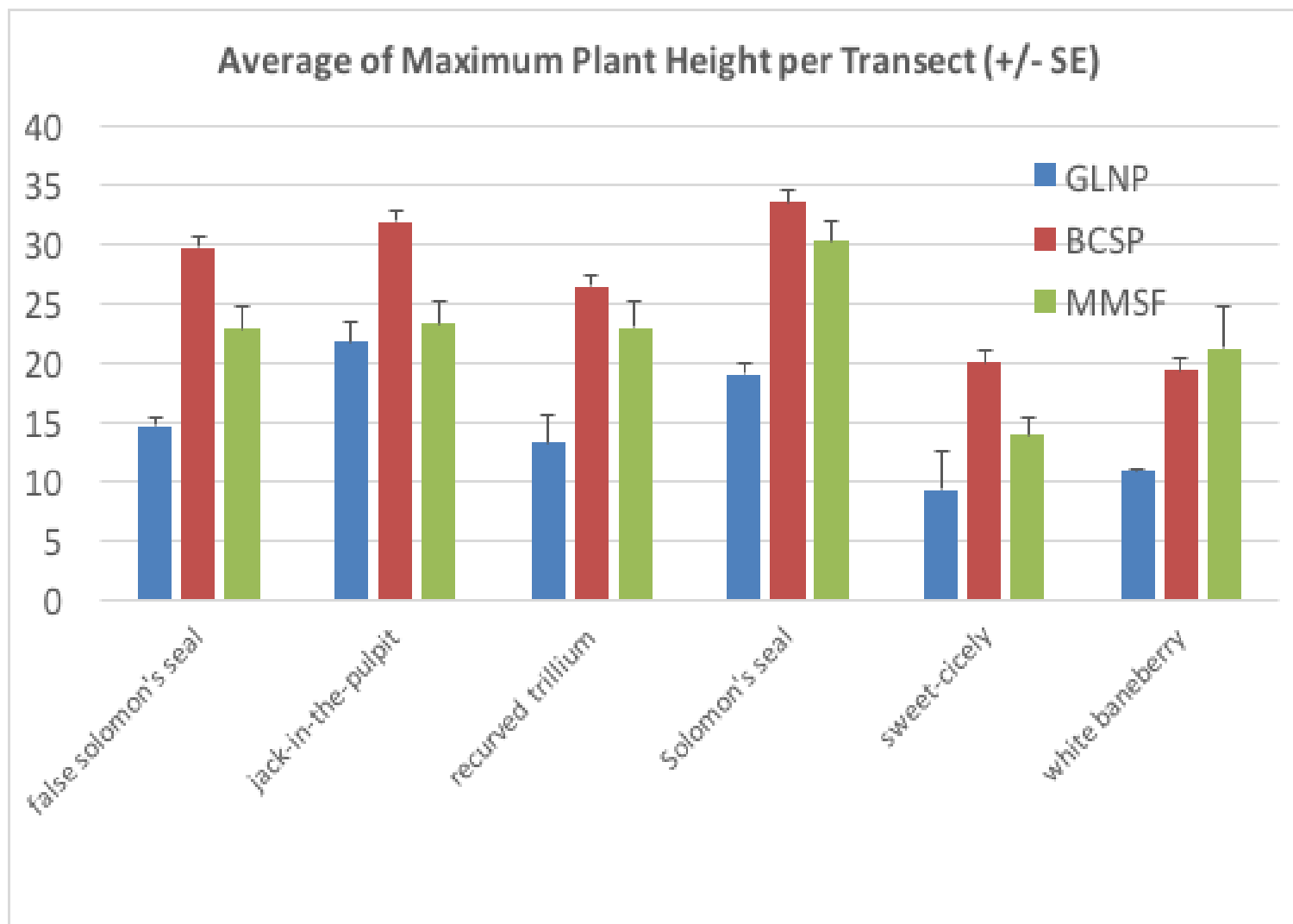
Average # Flowering Plants Per Transect



All six species have fewer flowering plants at GLNP.

Graph shows only the less common species from previous slide.





Largest plants of all six species were shorter at GLNP than other sites.

Why Survey Spring Ephemerals?

- Very susceptible to deer browsing: first fresh green food after winter
- Most species are long-lived perennials that have to get several years old before they have energy to make flowers
- If plants are browsed, they may grow back smaller next year and delay flowering.
- This can lead to extinction of local populations.



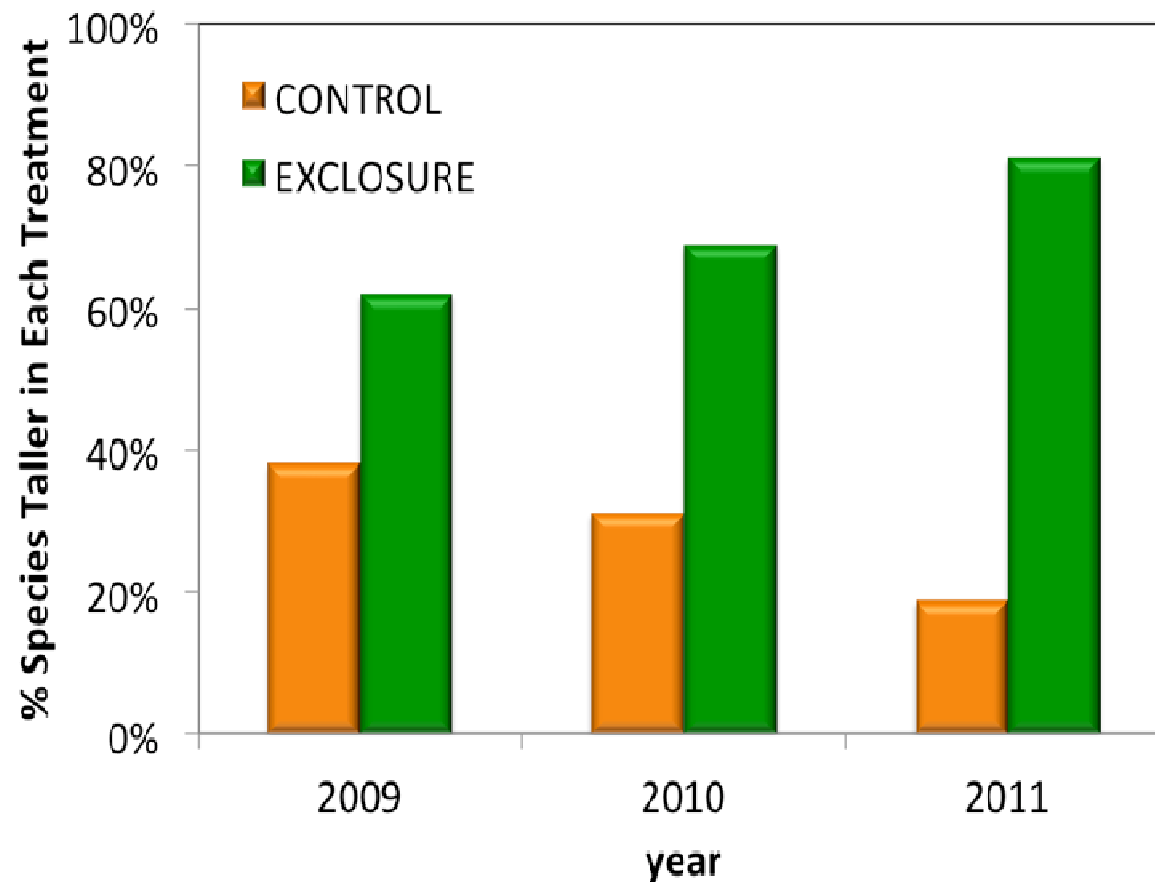
Indicator Species for Deer in Indiana

Height of these species is a good indicator of deer browsing intensity in Indiana (Webster and Parker 1996)



	Average Height (cm)	
	control	fenced
jack-in-the-pulpit	10.6	14.0
sweet cicely	-	14.7
white baneberry	10.3	20.5

Effect of Deer on Plant Height



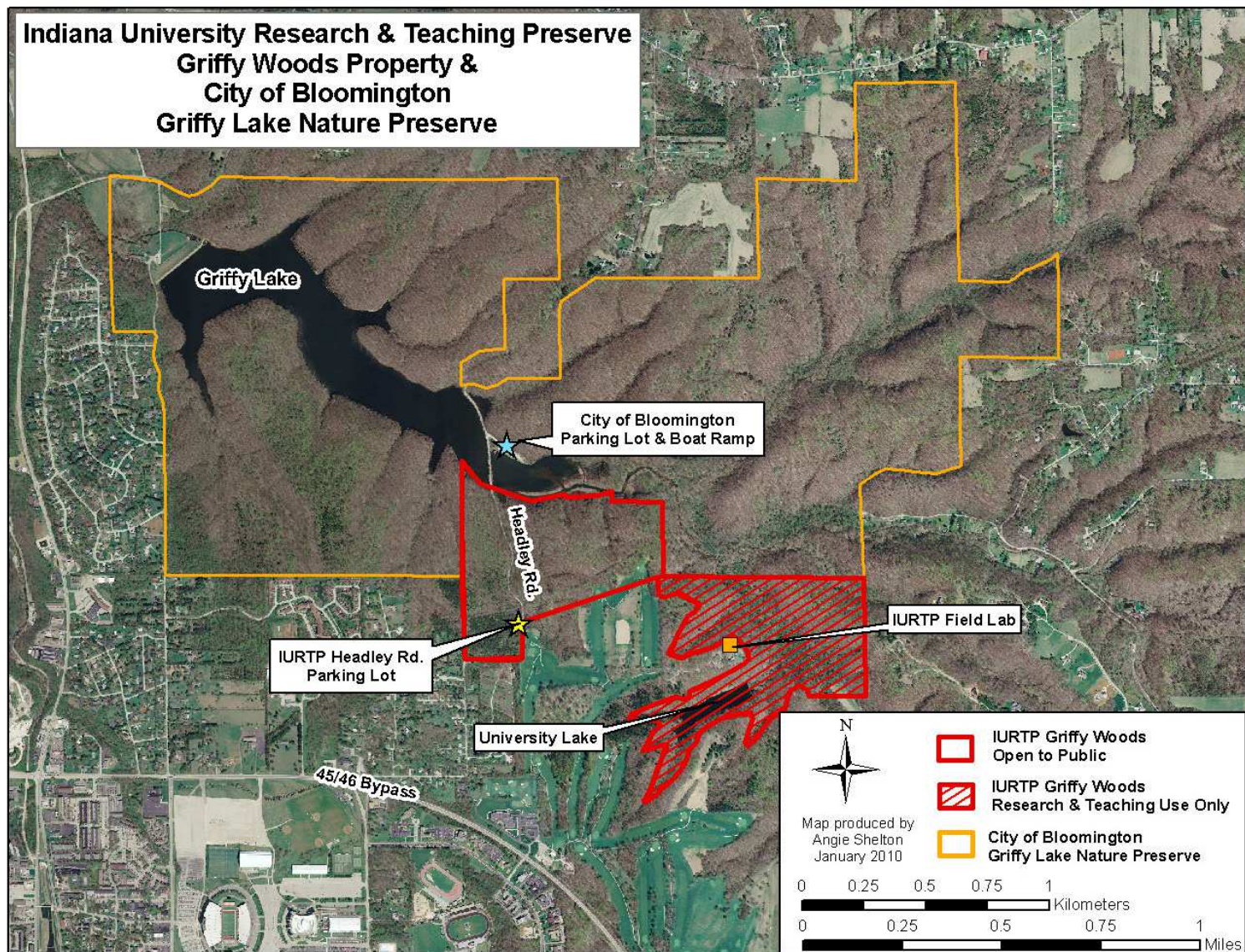
After protection from deer, plants grow taller.

Taller plants have greater chance of reproduction.

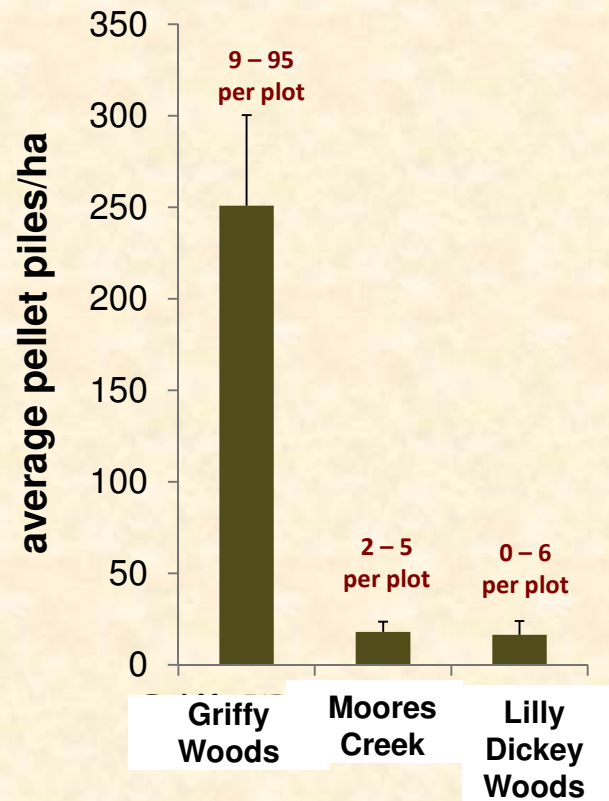
Ecological Effects of Deer Overpopulation

- increases plant invasions (Vavra et al 2007, Baiser et al 2008)
- reduces size of eaten and uneaten plants (Heckel et al 2010)
- increases soil compaction (Heckel et al 2010)
- inhibits natural succession and tree regeneration (Côté et al 2004, Rooney & Waller 2003)
- causes shift to alternative community types (Webster et al 2008, Augustine et al 1998, Waller & Alverson 1997)
- reduces habitat for birds, small mammals, other animals (McShea & Rappole 2000)
- reduces food resources for other herbivores (Côté et al 2004)
- reduces litter depth (Heckel et al 2010)
- increases bare soil → erosion and sediment runoff
- increases disease in deer populations (Côté et al 2004)
- makes humans cranky (countless citizens)

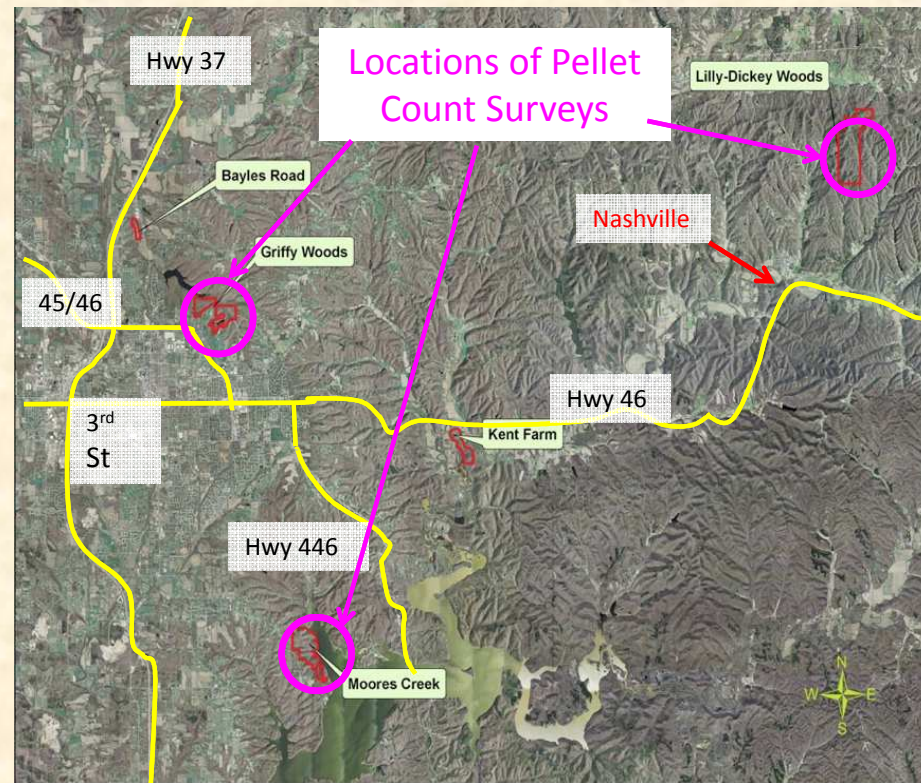
**Indiana University Research & Teaching Preserve
Griffy Woods Property &
City of Bloomington
Griffy Lake Nature Preserve**



Griffy Woods Deer Density

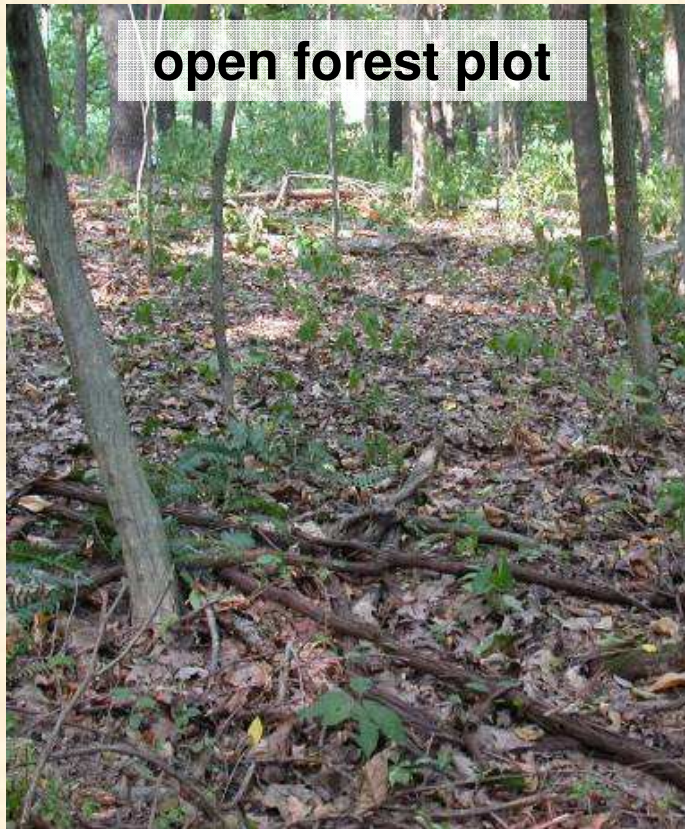


* Plot Area = 1664 m². 1 ha = 10,000 m².



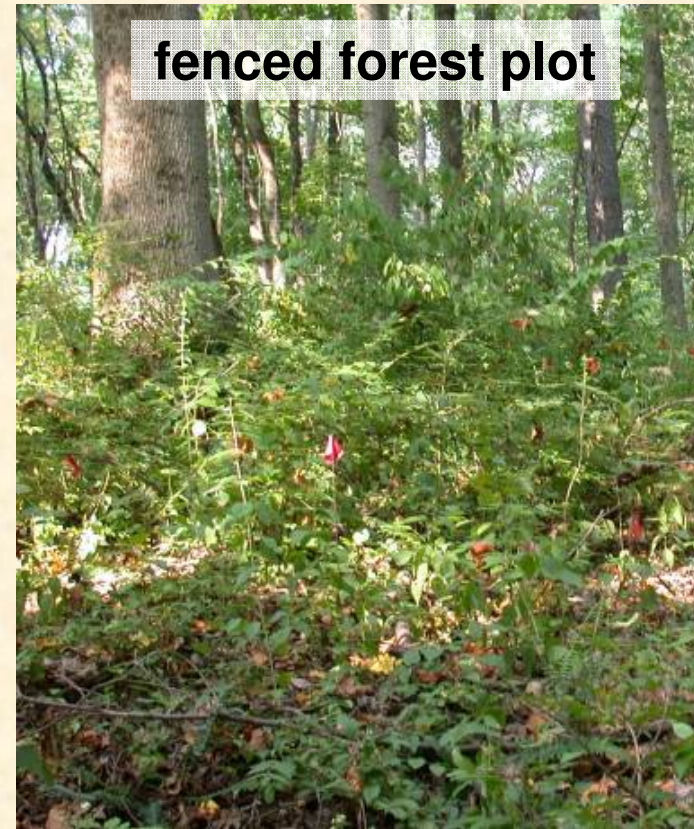
Approximately 11 times more pellet piles at Griffy Woods than at two other nearby Preserves.

Effects on Woody Plants



open forest plot

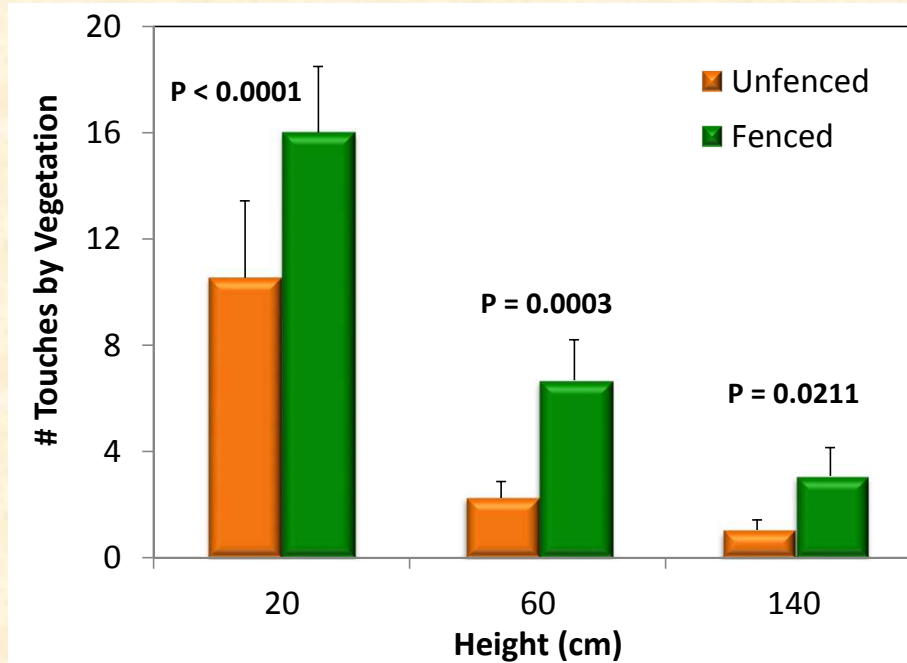
28 woody plants
7 species



fenced forest plot

204 woody plants
21 species

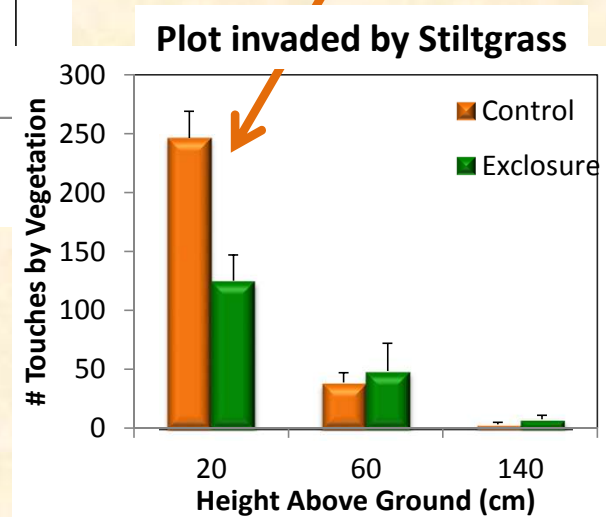
Vegetative Structure



Vegetation is significantly more abundant inside exclosures at all heights within browse range. Data collected after 2-3 years of fencing.

Japanese stiltgrass is more abundant in controls than exclosures.

Suggests interaction between deer and invasive species.



Tree and Shrub Seedlings

